

newly cited prior art reference, Yamamoto (JP-A 10-092865) for reasons stated on page 3 of the final Office action. The rejection is respectfully traversed, however. Applicants submit that the features of the present invention are not disclosed under 35 U.S.C. §102(b) or suggested under 35 U.S.C. §103(a) by Yamamoto '865. Therefore, Applicants respectfully request the Examiner to reconsider and withdraw this rejection for the following reasons.

Yamamoto '865 describes part of the background art of Applicants' disclosed invention. Specifically, on page 5, lines 5-12 of Applicants' original disclosure, Applicants cite Yamamoto '865 for disclosing:

“a semiconductor device of a type in which a resin layer for cushioning stress is installed between external electrodes and semiconductor elements. Individual semiconductor devices are manufactured by processing units of semiconductor wafer in a batch and finally cutting each semiconductor wafer into pieces.”

The problem of this type of semiconductor device as described by Yamamoto '865 is that,

“a plurality of resin layers and external electrodes are formed in units of semiconductor wafers in a batch, and then each semiconductor wafer is cut (diced) into pieces, has a constitution such that the interfaces of a plurality of resin layers sequentially formed on each semiconductor wafer are exposed on the end face of each semiconductor package, so that when a large mechanical stress is applied to the interfaces of the plurality of resin layers at the time of dicing of the semiconductor wafer, or when a large thermal stress is applied to the interfaces of the plurality of resin layers due to sudden temperature changes at the time of mounting of the semiconductor package, the stress is centralized to the interfaces between the semiconductor element exposed on the end face of the semiconductor package and the plurality of resin layers, so that one or more of the plurality of resin layers are peeled off and the semiconductor package may be damaged.”

As mentioned above, such a known semiconductor device

cannot always exhibit high reliability, and it is difficult to obtain a high manufacturing yield rate." See pages 5-6 of Applicants' original disclosure.

Applicants seek to address the problem identified with Yamamoto '865, and propose a semiconductor device in which a semiconductor element has at least a stress cushioning layer and a semiconductor protective layer, and end faces of these layers are positioned inside the cutting scribe lines formed on a semiconductor wafer, and the range of the surface at the end of the semiconductor element from the end face to the inside of the scribe line is exposed, see page 1, lines 5-15 of Applicants' original disclosure. This is done to withstand the concentrated stress applied at the time of cutting a semiconductor wafer and at the time of mounting a semiconductor device in order to minimize damage due to the applied stress and thereby obtaining high reliability and manufacturing yield rate, see page 6, lines 16-25 of Applicants' original disclosure.

Specifically, independent claim 1 expressly defines a semiconductor device comprising:

"semiconductor elements obtained by cutting a semiconductor wafer having an integrated circuit and an electrode pad formed on one side along a cutting scribe line, a stress cushioning layer installed on said semiconductor elements, a lead wire portion extending from said electrode pad to a top of said stress cushioning layer through an opening formed in said stress cushioning layer on said electrode pad, external electrodes arranged on said lead wire portion on top of said stress cushioning layer, and a conductor protective layer installed on said stress cushioning layer excluding said external electrodes arranged on said lead wire portion, wherein said stress cushioning layer, said lead wire portion, said conductor protective layer, and said external electrodes have means for forming each end face on an end surface of said semiconductor elements inside said cutting scribe line and exposing a range from said end face on said end surface of

said semiconductor elements to an inside of said cutting scribe line.”

Likewise, independent claim 5 defines a semiconductor device comprising:

“semiconductor elements obtained by cutting a semiconductor wafer having an integrated circuit and an electrode pad formed on one side along a cutting scribe line, a semiconductor element protective layer installed on said semiconductor elements, a stress cushioning layer installed on said semiconductor element protective layer, a first opening formed in said semiconductor element protective layer on said electrode pad, a second opening formed in said stress cushioning layer on said electrode pad, a lead wire portion extending to a top of said stress cushioning layer through said first opening and said second opening respectively from said electrode pad, external electrodes arranged on said lead wire portion on top of said stress cushioning layer, and a conductor protective layer installed on said stress cushioning layer excluding said external electrodes arranged on said lead wire portion, wherein said semiconductor element protective layer, said stress cushioning layer, said lead wire portion, said conductor protective layer, and said external electrodes have means for forming each end face on an end surface of said semiconductor elements inside said cutting scribe line and exposing a range from said end face on said end surface of said semiconductor elements to an inside of said cutting scribe line.”

Similarly, independent claim 33, as renumbered, defines a semiconductor device comprising:

“at least one semiconductor element including an electrode pad formed on one side along a cutting scribe line;
 a stress cushioning layer formed on said semiconductor element;
 a lead wire portion extending from said electrode pad to a top of said stress cushioning layer through an opening formed in said stress cushioning layer on said electrode pad;
 external electrodes installed on said lead wire portion on top of said stress cushioning layer; and
 a conductor protective layer installed on said stress cushioning layer excluding said external electrodes arranged on said lead wire portion,
 wherein said stress cushioning layer, said lead wire portion, said conductor protective layer, and said external electrodes include means for forming each end face on an end surface of said semiconductor

element inside said cutting scribe line and exposing a range from said end face on said end surface of said semiconductor elements to an inside of said cutting scribe line."

In contrast to Applicants' independent claims 1, 5 and 33, Yamamoto '865 discloses none of these features, as expressly acknowledged in the background of Applicants' original disclosure.

Nevertheless, in support of the rejection of Applicants' claims 1, 5 and 33, the Examiner simply asserts that Yamamoto '865 teaches,

"a semiconductor device (see entire disclosure) comprising an electrode pad (13), a stress cushioning layer 917), a lead wire (14), external electrodes (11), and a conductor protective layer (10) (see Figs. 1-2)."

Notwithstanding the fact that the Examiner has ignored all the essential features of Applicants' independent claims 1, 5 and 33, Yamamoto '865, as discussed previously, addresses a different problem and the solution disclosed by Yamamoto '865 has problems which are the reasons for Applicants' disclosed invention.

Specifically, Yamamoto '865 proposes to prevent a semiconductor element with a small number of pins such as a memory, a general-purpose microcomputer, etc., from becoming expensive and the miniaturization rate of QFP from becoming small, even if it is made into CSP (chip size package). See Abstract.

For this purpose, the metallic wiring 14 drawn out of the element electrode 13 of a semiconductor element 12 is made on a first resin layer 15, as shown in FIG.2, and the element electrode 13 of the semiconductor element 12 and a package

electrode 11 are electrically connected with each other through the metallic wiring 14. Then, the electric connection with outside is performed at the package electrode 11 positioned in the opening of a second resin layer 10. Moreover, the stress caused by the difference of thermal expansion between a mounting board and the silicon (Si) of the semiconductor element 12 when this semiconductor device and an outside mounting board are mounted is relieved by the polyimide resin layer 17, a first resin layer 15, and a second resin layer 10 made on a passivation film 16. Thus, the chip size package (CSP) can be manufactured at low cost, because they are processed en block in wafer units without performing individual assembly.

While some elements of Yamamoto '865 may be considered as similar to some of Applicants' elements as defined in independent claims 1, 5 and 33, the configuration, arrangement and functions of Yamamoto '865 and Applicants' claimed invention are completely different.

For example, and for the Examiner's convenience, the element electrode 13, as shown in FIG. 2 of Yamamoto '865, may correspond to the electrode pad of Applicants' claimed invention. Similarly, the polyimide resin layer 17, as shown in FIG. 2 of Yamamoto '865, may correspond to the semiconductor protective layer of Applicants' claimed invention. The package electrode 11, as shown in FIG. 2 of Yamamoto '865 may correspond to the external electrode of Applicants' claimed invention. The first resin layer 15, as shown in FIG. 2 of Yamamoto '865, may correspond to the stress cushioning layer of Applicants' claimed invention, and the second resin layer 10, as shown in FIG. 2 of Yamamoto '865, may correspond to the surface protective layer of Applicants' claimed invention.

However, the second resin layer 10, as shown in FIG. 2 of Yamamoto '865, does not correspond to Applicants' claimed "conductor protective layer". Similarly, the polyimide layer 17, as shown in FIG. 2 of Yamamoto '865, does not serve as the stress cushioning layer as alleged by the Examiner. Rather, in Yamamoto '865, the stress cushioning layer is the first resin layer 15. *why?*

More importantly, in Yamamoto '865, none of the elements is described in anyway to address the damage due to the concentrated stress applied at the time of cutting a semiconductor wafer and at the time of mounting a semiconductor device, see page 6, lines 16-25 of Applicants' original disclosure. As a result, no where in Yamamoto '865 is there disclosure or suggestion that all the elements in Applicants' claims 1, 5 and 33 are located inside of the peripheral edge of the semiconductor element. *1*

Regarding to dependent claims 2, 6, and 34, the Examiner asserts that Yamamoto '865 teaches the end face of the conductor protective layer (10) is formed inside the end face the stress cushioning layer (17). Similarly, regarding dependent claims 3, 7, 8 and 36, the Examiner asserts that Yamamoto '865 teaches the end face of the conductor protective layer (10) is formed outside said end face the stress cushioning layer (17). However, no where in Yamamoto '865 is there a disclosure or suggestion as to how the conductor protective layer is formed on both of inside and outside of the stress cushioning layer.

As can be seen from FIG. 2, elements 11 and 12 of Yamamoto '865, the elements have the peripheral edges located the peripheral edge of the semiconductor element. As a result, the element construction of Yamamoto '865 is

completely different from the element construction of Applicants' claims 1, 5 and 33.

The rule under 35 U.S.C. §102 is well settled that anticipation requires that each and every element of the claimed invention be disclosed in a single prior art reference. In re Paulsen, 30 F.3d 1475, 31 USPQ2d 1671 (Fed. Cir. 1994); In re Spada, 911 F.2d 705, 15 USPQ2d 1655 (Fed. Cir. 1990). Those elements must either be inherent or disclosed expressly and must be arranged as in the claim. Richardson v. Suzuki Motor Co., 868 F.2d 1226, 9 USPQ2d 1913 (Fed. Cir. 1989); Constant v. Advanced Micro-Devices, Inc., 848 F.2d 1560, 7 USPQ2d 1057 (Fed. Cir. 1988); Verdegall Bros., Inc. v. Union Oil Co., 814 F.2d 628, 2 USPQ2d 1051 (Fed. Cir. 1987). The corollary of that rule is that absence from the reference of any claimed element negates anticipation. Kloster Speedsteel AB v. Crucible Inc., 793 F.2d 1565, 230 USPQ2d 81 (Fed. Cir. 1986).

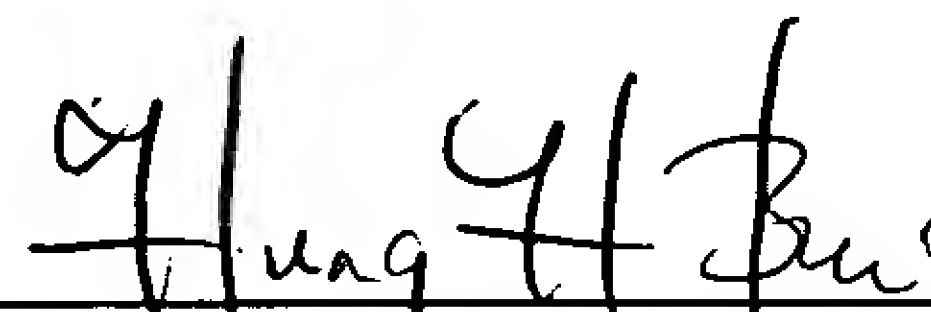
In the present situation, Yamamoto '865 fails to disclose and suggest virtually all the essential features of Applicants' claims 1-10 and 28-36. Therefore, Applicants respectfully request that the rejection of claims 1-10 and 28-36 under either under 35 U.S.C. §102(b) or suggested under 35 U.S.C. §103(a) be withdrawn.

In view of the foregoing amendments, arguments and remarks, all claims 1-10 and 28-36 are deemed to be allowable and this application is believed to be in condition to be passed to issue. Should any questions remain unresolved, the Examiner is requested to telephone Applicants' attorney at the Washington DC area office at (703) 312-6600.

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Respectfully submitted,
ANTONELLI, TERRY, STOUT & KRAUS, LLP



Hung H. Buil (Reg. No. 40,415)
Attorney for Applicant(s)

HHB:srm
(703) 312-6600